

1
INTERNATIONAL-TYPE SEARCH REPORT

Search Request No.

DK 99/00032

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H02K 21/24, H02K 21/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| Y | DE 4223836 A1 (DORNIER GMBH), 27 January 1994 (27.01.94), column 1, line 63 - column 2, line 10, figures 1-4 -- | 1-40 |
| Y | EP 0225616 A1 (MITSUBISHI KINZOKU KABUSHIKI KAISHA), 16 June 1987 (16.06.87), page 3, line 20 - page 6, line 25, figures 1-2 -- | 1-40 |
| Y | Derwent's abstract, No 85- 29816/05, week 8505, ABSTRACT OF SU, 1096736 (KONSTANTINOV P I), 7 June 1984 (07.06.84) -- | 5-7, 27 |

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international-type search

Date of mailing of the international-type search report

1993-09-15

10 September 1993

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. + 46 8 666 02 86

Authorized officer

Håkan Sandh/AE
Telephone No. + 46 8 782 25 00

INTERNATIONAL-TYPE SEARCH REPORT

Search Request No.

DK 99/00032

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| Y | WO 9826495 A2 (ADVANCED TECHNOLOGIES INTERNATIONAL, LTD. ET AL.), 18 June 1998 (18.06.98), figures 2-4, 11-12,15, abstract -- | 1-40 |
| Y | EP 0162927 A1 (FANUC LTD), 4 December 1985 (04.12.85), page 1, line 8 - page 2, line 24; page 5, line 25 - page 6, line 17, figures 1-2 -- ----- | 1-40 |
| | | |

INTERNATIONAL-TYPE SEARCH REPORT

Information on patent family members

02/08/99

Search Request No.

DK 99/00032

| | | | | | | |
|----|---------|----|----------|------|------------|----------|
| DE | 4223836 | A1 | 27/01/94 | NONE | | |
| EP | 0225616 | A1 | 16/06/87 | CA | 1273981 A | 11/09/90 |
| | | | | JP | 63171145 A | 14/07/88 |
| | | | | US | 4748361 A | 31/05/88 |
| WO | 9826495 | A2 | 18/06/98 | AU | 7851098 A | 03/07/98 |
| EP | 0162927 | A1 | 04/12/85 | JP | 60102855 A | 07/06/85 |
| | | | | WO | 8502068 A | 09/05/85 |

1
INTERNATIONAL SEARCH REPORTInternational application No.
PCT/DK 00/00054

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H02K 21/24, H02K 21/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|---|
| X | US 5436518 A (TERUO KAWAI), 25 July 1995 (25.07.95), column 5, line 19 - column 12, line 48 | 1-4,8-13, 18-22,25,26, 28,30-39, 44-48 |
| Y | -- | 5-7,14-17, 23-24,27,29, 40-43 |
| X | DE 19545680 A1 (FER FAHRZEUGELEKTRIK GMBH), 12 June 1997 (12.06.97), column 3, line 3 - line 50 | 1-4,12-13, 19,21,32, 35-39 |

 Further documents are listed in the continuation of Box C. See patent family annex.

| | |
|---|--|
| * Special categories of cited documents: | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
| "A" document defining the general state of the art which is not considered to be of particular relevance | "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone |
| "E" earlier document but published on or after the international filing date | "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |
| "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "&" document member of the same patent family |
| "O" document referring to an oral disclosure, use, exhibition or other means | |
| "P" document published prior to the international filing date but later than the priority date claimed | |

Date of the actual completion of the international search

8 May 2000

Date of mailing of the international search report

20.07.00

Name and mailing address of the ISA/
European Patent Office

Authorized officer

Håkan Sandh/mj
Telephone No.

Facsimile No.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 00/00054

| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|---|---|--|
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| Y | US 5642009 A (PATRICK J. MCCLEER ET AL), 24 June 1997 (24.06.97) | 16,17 |
| A | -- | 20 |
| Y | DE 4223836 A1 (DORNIER GMBH), 27 January 1994 (27.01.94), column 1, line 63 - column 2, line 10, figures 1-4 | 15 |
| | -- | |
| Y | EP 0225616 A1 (MITSUBISHI KINZOKU KABUSHIKI KAISHA), 16 June 1987 (16.06.87), page 3, line 20 - page 6, line 25, figures 1-2 | 5-7, 14, 15, 23, 24, 27, 29, 41-43 |
| | -- | |
| Y | Derwent's abstract, No 85-29816/05, week 8505, ABSTRACT OF SU, 1096736 (KONSTANTINOV P I), 7 June 1984 (07.06.84) | 5-7 |
| | -- | |
| Y | EP 0162927 A1 (FANUC LTD), 4 December 1985 (04.12.85), page 1, line 8 - page 2, line 24; page 5, line 25 - page 6, line 17, figures 1-2 | 40 |
| | -- | |
| A | US 3482131 A (ELVIN D. LYTLE), 2 December 1969 (02.12.69), figure 2 | 34 |
| | -- | |
| P,X | WO 9948187 A1 (LIGHT ENGINEERING CORPORATION), 23 Sept 1999 (23.09.99), page 3, line 24 - page 8, line 6 | 1-48 |
| | ----- | |

INTERNATIONAL SEARCH REPORT
Information on patent family members

SA 2837

International application No.
PCT/DK 00/00054

02/12/99

| Patent document cited in search report | Publication date | Patent family member(s) | | Publication date |
|--|------------------|-------------------------|----------|------------------|
| US 5436518 A | 25/07/95 | NONE | | |
| DE 19545680 A1 | 12/06/97 | EP 0778654 A | 11/06/97 | |
| | | US 5932943 A | 03/08/99 | |
| US 5642009 A | 24/06/97 | AU 4793193 A | 29/03/94 | |
| | | US 5387854 A | 07/02/95 | |
| | | US 5394321 A | 28/02/95 | |
| | | WO 9406198 A | 17/03/94 | |
| DE 4223836 A1 | 27/01/94 | NONE | | |
| EP 0225616 A1 | 16/06/87 | CA 1273981 A | 11/09/90 | |
| | | JP 63171145 A | 14/07/88 | |
| | | US 4748361 A | 31/05/88 | |
| EP 0162927 A1 | 04/12/85 | JP 60102855 A | 07/06/85 | |
| | | WO 8502068 A | 09/05/85 | |
| US 3482131 A | 02/12/69 | NONE | | |
| WO 9948187 A1 | 23/09/99 | NONE | | |

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|--|---|--|
| Applicant's or agent's file reference P199900105W0 | FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. | |
| International application No. PCT/DK 00/ 00054 | International filing date (day/month/year) 09/02/2000 | (Earliest) Priority Date (day/month/year) 10/02/1999 |
| Applicant MULTIPOLGENERATOR APS et al. | | |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of **3** sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. **Certain claims were found unsearchable** (See Box I).

3. **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

12

None of the figures.

1
INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR 00/00054

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H02K 21/24, H02K 21/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|---|
| X | US 5436518 A (TERUO KAWAI), 25 July 1995 (25.07.95), column 5, line 19 - column 12, line 48 | 1-4,8-13, 18-22,25,26, 28,30-39, 44-48 |
| Y | | 5-7,14-17, 23-24,27,29, 40-43 |
| X | DE 19545680 A1 (FER FAHRZEUGELEKTRIK GMBH), 12 June 1997 (12.06.97), column 3, line 3 - line 50 | 1-4,12-13, 19,21,32, 35-39 |

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

8 May 2000

20.07.00

Name and mailing address of the ISA/
European Patent Office

Authorized officer

Facsimile No.

Håkan Sandh/mj
Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/UK 00/00054

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-------------------------------------|
| Y | US 5642009 A (PATRICK J. MCCLEER ET AL), 24 June 1997 (24.06.97) | 16,17 |
| A | -- | 20 |
| Y | DE 4223836 A1 (DORNIER GMBH), 27 January 1994 (27.01.94), column 1, line 63 - column 2, line 10, figures 1-4 | 15 |
| Y | EP 0225616 A1 (MITSUBISHI KINZOKU KABUSHIKI KAISHA), 16 June 1987 (16.06.87), page 3, line 20 - page 6, line 25, figures 1-2 | 5-7,14,15, 23,24,27,29, 41-43 |
| Y | Derwent's abstract, No 85-29816/05, week 8505, ABSTRACT OF SU, 1096736 (KONSTANTINOV P I), 7 June 1984 (07.06.84) | 5-7 |
| Y | EP 0162927 A1 (FANUC LTD), 4 December 1985 (04.12.85), page 1, line 8 - page 2, line 24; page 5, line 25 - page 6, line 17, figures 1-2 | 40 |
| A | US 3482131 A (ELVIN D. LYCLE), 2 December 1969 (02.12.69), figure 2 | 34 |
| P,X | WO 9948187 A1 (LIGHT ENGINEERING CORPORATION), 23 Sept 1999 (23.09.99), page 3, line 24 - page 8, line 6 | 1-48 |
| | ----- | |

SA 267837

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.

PCT/UK 00/00054

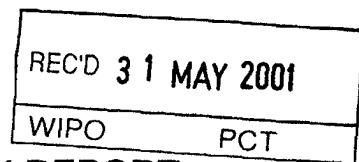
| Patent document cited in search report | Publication date | Patent family member(s) | | | Publication date |
|--|------------------|-------------------------|------------|--|------------------|
| US 5436518 A | 25/07/95 | NONE | | | |
| DE 19545680 A1 | 12/06/97 | EP | 0778654 A | | 11/06/97 |
| | | US | 5932943 A | | 03/08/99 |
| US 5642009 A | 24/06/97 | AU | 4793193 A | | 29/03/94 |
| | | US | 5387854 A | | 07/02/95 |
| | | US | 5394321 A | | 28/02/95 |
| | | WO | 9406198 A | | 17/03/94 |
| DE 4223836 A1 | 27/01/94 | NONE | | | |
| EP 0225616 A1 | 16/06/87 | CA | 1273981 A | | 11/09/90 |
| | | JP | 63171145 A | | 14/07/88 |
| | | US | 4748361 A | | 31/05/88 |
| EP 0162927 A1 | 04/12/85 | JP | 60102855 A | | 07/06/85 |
| | | WO | 8502068 A | | 09/05/85 |
| US 3482131 A | 02/12/69 | NONE | | | |
| WO 9948187 A1 | 23/09/99 | NONE | | | |

14

PATENT COOPERATION TREATY
PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



| | | |
|---|--|---|
| Applicant's or agent's file reference P199900105WO | FOR FURTHER ACTION | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
| International application No. PCT/DK00/00054 | International filing date (day/month/year) 09/02/2000 | Priority date (day/month/year) 10/02/1999 |
| International Patent Classification (IPC) or national classification and IPC H02K21/24 | | |
| <p>Applicant MULTIPOLGENERATOR APS et al.</p> <p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 7 sheets.</p> <p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input checked="" type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application | | |

| | |
|---|---|
| Date of submission of the demand 28/08/2000 | Date of completion of this report 29.05.2001 |
| Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | Authorized officer Drysdale, N Telephone No. +49 89 2399 2435 |



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/DK00/00054

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-25 as originally filed

Claims, No.:

1-40 with telefax of 19/02/2001

Drawings, sheets:

1/23-23/23 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.: 41-48

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/DK00/00054

the drawings, sheets:

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | |
|-------------------------------|-----------------------|
| Novelty (N) | Yes: Claims 1-40 |
| | No: Claims |
| Inventive step (IS) | Yes: Claims 1-40 |
| | No: Claims |
| Industrial applicability (IA) | Yes: Claims 1-40 |
| | No: Claims |

2. Citations and explanations **see separate sheet**

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/DK00/00054

V. Reasoned statement
2. Citations and explanations

1. Reference is made to the following documents:

D1 = US 5 436 518 A

D2 = US 5 642 009 A

D3 = DE 42 23 836 A

D4 = EP 0 627 805 A

D4 was not cited in the international search report.

2. The amended claims include two independent claims for an electrical machine (Nos. 1 & 3) and one independent claim (No. 31) directed to the use of an electrical machine. New claims 1 and 3 are based on original claims 1, 2 and 5. Claim 1 includes a further feature, "wherein a magnetic flux path includes two and only two pole cores and two and only two air gaps" which is supported by original page 5, lines 3-5. Claim 3 includes the further feature, "wherein the plurality of magnets or means for producing a magnetic field are arranged in pairs having poles of similar polarity facing each other", corresponding to original claim 31. New claim 31 was original claim 39. The amended claims therefore satisfy the requirements of Art. 34(2)(b) PCT.

3. Document D1 is considered to represent the closest available prior art. D1 discloses (Figs. 1 & 2) an electrical machine comprising:
a rotor (13, 14) secured to a shaft (11) with an axis of rotation and comprising two permanent magnets (13);
a stator (10, 16a-*l*) with air gaps formed between the rotor and the stator, the stator comprising a plurality of pole cores (16a-*l*). The separate pole cores have corresponding separate coils wound on and surrounding the pole cores. In the present application it appears that the applicant means by "separate" coils that the ends of each coil are taken out of the machine, i.e. that coils are not connected in series (see page 2, lines 12-14, page 13, line 37 to page 14, line 4). The coils of D1 are also "separate" in this sense (col. 5, line 66 to col. 6, line 2; Fig. 3).

At least a portion of each of the pole cores (16a-*l*) is substantially parallel to

INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET

International application No. PCT/DK00/00054

the axis of rotation (Fig. 2). At least a portion of one or more of the pole cores is therefore arranged at an angle to the axis of rotation (whereby it appears from the description and drawings that this angle is measured in a plane containing the axis of rotation), said angle being **equal to** 0 degrees and therefore less than θ , where θ is 90°, 45° or 30°.

The pole cores form parts of one or more magnetic circuits (Figs. 5A, 5B).

4. The subject-matter of claim 1 is distinguished from the machine of D1 in that:
a magnetic flux path includes two and only two pole cores and two and only two air gaps.

Particular embodiments of this feature are shown in, e.g., Figs. 2, 3 and 6.

In D1, in contrast, two annular magnets (13, 13) are axially polarised to produce a homopolar field at the ends of the machine, and each flux path includes only one pole core (Figs. 4B-4H and 5B).

The arrangement of the magnetic flux paths in accordance with claim 1 appears to permit a more efficient utilisation of the magnetic material of the pole cores, and is neither known from, nor rendered obvious by, any of the available documents representing the state of the art.

The subject-matter of claim 1 is therefore new and inventive in the light of the available prior art (Art. 33(2) & (3) PCT).

5. The subject-matter of claim 3 is distinguished from the machine of D1 in that:
the plurality of magnets or means for producing a magnetic field are arranged (on the rotor) in pairs having poles of similar polarity facing each other. What this means in the application is illustrated in Fig. 2 (magnets(12); page 12, lines 29-32) and Fig. 4a (magnets (42); page 15, lines 28-31).

In D1, in contrast, the two annular magnets (13) are **not** arranged with poles of similar polarity facing each other (Fig. 5A).

The arrangement of the magnets according to claim 3 has the effect of concentrating the magnetic flux in the pole cores (page 16, lines 7-12).

6. The distinguishing feature of claim 3 is known per se from document D4 (Fig. 3), and in the context of a generator for use with a wind turbine. However, no particular advantage is disclosed in D4 for this arrangement and the rest of the structure of the machine is different from that of the present application. It cannot be regarded as obvious for a skilled person to take one feature in isolation from one machine and insert it in another machine, thereby producing a completely different magnetic circuit.

The subject-matter of claim 3 is therefore new and inventive in the light of the available prior art (Art. 33(2) & (3) PCT).

7. Claim 31 concerns the use of such machines in a wind turbine. Its subject-matter is therefore also new and inventive in the light of the available prior art (Art. 33(2) & (3) PCT).
8. The dependent claims define advantageous embodiments of the machines of claims 1 and 3. Their subject-matter is therefore also novel and inventive (Art. 33(2) & (3) PCT).
9. Industrial applicability (Article 33(4) PCT) is obvious for all claims.

VII. Certain defects

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D4 is not mentioned in the description, nor are these documents identified therein.
2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
3. The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT.



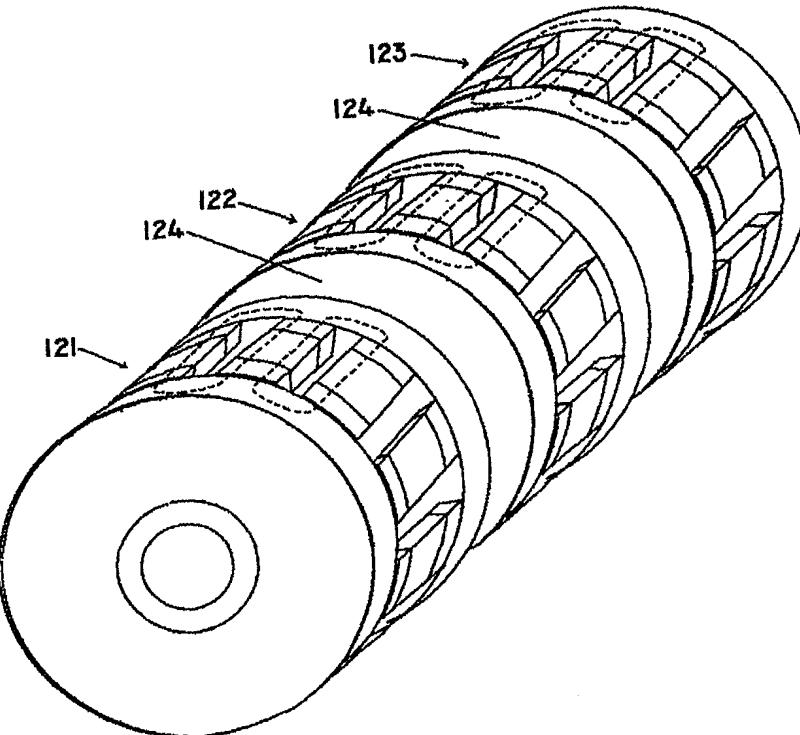
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| | | | |
|---|--|--|---|
| (51) International Patent Classification ⁷ : H02K 21/24, 21/26 | | A1 | (11) International Publication Number: WO 00/48297 (43) International Publication Date: 17 August 2000 (17.08.00) |
| <p>(21) International Application Number: PCT/DK00/00054</p> <p>(22) International Filing Date: 9 February 2000 (09.02.00)</p> <p>(30) Priority Data: PA 1999 00177 10 February 1999 (10.02.99) DK</p> <p>(71) Applicant (for all designated States except US): MULTIPOL-GENERATOR APS [DK/DK]; Forskerparken CAT, Frederiksborghavej 399, DK-4000 Roskilde (DK).</p> <p>(72) Inventors; and</p> <p>(75) Inventors/Applicants (for US only): DAM LARSEN, Kim [DK/DK]; Brådevej 14, Hølkerup, DK-4500 Nykøbing SJ. (DK). RASMUSSEN, Peter [DK/DK]; Knasterhovvej 21, Tåsing, DK-5700 Svendborg (DK). DAM LARSEN, Uffe [DK/DK]; Tibirkegade 1, 1. th., DK-2200 Copenhagen N. (DK).</p> <p>(74) Agent: HOFMAN-BANG A/S; Hans Bekkevolds Allé 7, DK-2900 Hellerup (DK).</p> | | <p>(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p> | |

(54) Title: AN ELECTRIC MULTIPOL MOTOR/GENERATOR WITH AXIAL MAGNETIC FLUX

(57) Abstract

This invention relates to an electric multiple motor/generator with axial magnetic flux. Thus a generator/motor or electrical machine in which a magnetic flux path through one or more pole legs or pole cores surrounded by current windings or coils is provided. This allows a high density of the magnetic flux to be passed through the pole legs or cores, which results in a low consumption of material for the pole legs or pole cores compared with prior art machines, where for example a large stator diameter may be needed in order to conduct a high magnetic flux. Additionally the generator/motor or electrical machine is very efficient both at a low and a high number of revolutions. According to another aspect of the invention a multiple phase output without enlarging the diameter of the generator is provided.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 00/00054

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H02K 21/24, H02K 21/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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